## We claim:

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5	material su
1	2.
2	impedance
1	3
ពួ2	the substra
11 11 12 21 21	4. the sensor
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1. An accustic transducer comprising:

- a substrate having a topside and a backside;
- a microfabricated acoustic transducer formed on the topside of the substrate; and
- a damping material disposed on the backside of the substrate, the damping
- 5 material suppressing substrate acoustic modes.
- 1 2. An apparatus according to claim 1 wherein the damping material has an acoustic
- 2 impedance that is similar to the acoustic impedance of the substrate and is lossy.
- An apparatus according to claim 1 further including electronic circuits formed in the substrate.
  - 4. An apparatus according to claim 3 wherein the electronics circuits are in between the sensor and the damping material.
    - 5. An apparatus according to claim 1 wherein the substrate is a wafer.
  - 6. An apparatus according to claim 1 wherein the damping material suppresses a longitudinal ringing mode.
- 7. An apparatus according to claim wherein the damping material suppresses a lamb wave ringing mode.
- 1 8. An apparatus according to claim 1 wherein the microfabricated acoustic 2 transducer operates at frequencies above 20 kHz.
  - 9. An acoustic transducer comprising:
- a substrate having a topside and a backside, the substrate having a thickness such
- 3 that resonant modes of the substrate are outside a frequency band of interest; and
- 4 a microfabricated acoustic transducer formed on the topside of the substrate.

1	10.	An apparatus according to claim 9 further including:	
2		a damping material disposed on the backside of the substrate, the damping	
3	material suppressing substrate acoustic modes.		
1	11.	An apparatus according to claim 10 wherein the damping material suppresses	
2	lamb wave modes.		
1	12.	An apparatus according to claim 10 wherein the damping material has an acoustic	
2	impedance that is similar to the acoustic impedance of the substrate and is lossy.		
1	13.	An apparatus according to claim 12 further including electronic circuits formed in	
2	the substrate.		
1 2	14.	An apparatus according to claim 13 wherein the electronics circuits are in	
1 2	between the sensor and the damping material.		
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1 2 2	15.	An apparatus according to claim 9 further including electronic circuits formed in	
<u></u> 2	the substrate.		
	16.	An apparatus according to claim 9 wherein the substrate is a wafer.	
<u>2</u> 1	17.	An apparatus according to claim 9 wherein the microfabricated acoustic	
2	transducer operates at frequencies above 20 kHz.		
1	18.	An apparatus according to claim 9 wherein the damping material suppresses	
2	stonely wave		
2	Stollery wave	modes.	
1	19.	A method for suppressing acoustic modes, the method comprising:	
2		providing a substrate having a topside and a backside;	
3		forming a microfabricated acoustic transducer on the topside of the substrate; and	
4		placing a damping material on the backside of the substrate, the damping material	
5	suppressing substrate acoustic modes.		

1	20.	The method of claim 19 wherein the damping material has an acoustic impedance
2	that is similar to the acoustic impedance of the substrate and is lossy.	
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1	21.	The method of claim 20 further comprising forming electronic circuits in the
2	substrate.	
1	22.	The method of claim 21 wherein the electronics circuits are in between the sensor
2	and the dampi	ing material.
1	23.	The method of claim 19 wherein the substrate is a wafer.
1	24.	The method of claim 19 wherein the damping material suppresses a longitudinal
2 	ringing mode.	
15 15 1	25.	The method of claim 19 wherein the damping material suppresses a lamb wave
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ringing mode.	
<sup>[]</sup> 1	26.	The method of claim 19 further comprising operating the microfabricated acoustic
1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	transducer at frequencies above 20 kHz.	
U 1	27.	A method for suppressing acoustic modes, the method comprising:
<u>.</u> 2		providing a substrate having a topside and a backside, the substrate having a
3	thickness such that resonant modes of the substrate are outside a frequency band of interest; and	
· 4		forming a microfabricated acoustic transducer on the topside of the substrate.
1	28.	An apparatus according to claim 27 further including:
2		a damping material disposed on the backside of the substrate, the damping
3	material suppressing substrate acoustic modes.	
1	29.	The method of claim 28 wherein the damping material suppresses lamb wave
2	modes.	

1	30.	The method of claim 28 wherein the damping material has an acoustic impedance	
2	that is similar to the acoustic impedance of the substrate and is lossy.		
1	31.	The method of claim 30 further comprising forming electronic circuits in the	
2	substrate.		
1	32.	The method of claim 31 wherein the electronics circuits are in between the sensor	
2	and the damping material.		
1	33.	The method of claim 27 further comprising forming electronic circuits in the	
2	substrate.		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	34.	The method of claim 27 wherein the substrate is a wafer.	
	35.	The method of claim 27 further comprising operating the microfabricated acoustic	
2 1 1	transducer at frequencies above 20 kHz.		
<b>5</b> 1	36.	The method of claim 27 wherein the damping material suppresses stonely wave	
.≟ 2	modes.		